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10/560,122	04/28/2006	Manfred FAUBEL	47265.27	2757
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EXAMINER				
HO, ALLEN C				
ART UNIT		PAPER NUMBER		
2882				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/560,122

Applicant(s)

FAUBEL ET AL.

Examiner

Allen C. Ho

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 12, 13 and 19-43 is/are rejected.
- 7) ☒ Claim(s) 8-11 and 14-18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 December 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 20060407
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. Figure 7 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **30** in Fig. 8.
3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the rotating nozzle as claimed in claims 8, 27, and 40 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities:
- (1) The specification refers to the claims (page 1, lines 6-10; page 5, lines 13-16).
 - (2) Page 29, line 7, "50" should be replaced by --51--.
 - (3) Page 30, line 6, "pickup" should be replaced by --cavity--.

Appropriate correction is required.

Claim Objections

5. Claim 8 is objected to because of the following informalities:

Claim 8 should be rephrased as a method step.

Appropriate correction is required.

6. Claim 9 is objected to because of the following informalities:

Claim 9 should be rephrased as a method step.

Appropriate correction is required.

7. Claim 18 is objected to because of the following informalities:

- (1) Claim 18 should be rephrased as a method step.
- (2) Line 3, "irradiation" should be replaced by --irradiating--.
- (3) Claim 3 recites the limitation "the gas" in line 6. There is insufficient antecedent basis for this limitation in the claim.

(4) Line 7, "irradiation" should be replaced by --irradiating--.

Appropriate correction is required.

8. Claim 19 is objected to because of the following informalities:

(1) Claim 19 should be rephrased as a method step.

(2) Line 3, "irradiation" should be replaced by --irradiating--.

Appropriate correction is required.

9. Claim 22 is objected to because of the following informalities:

(1) Line 5, "the" before "target material" should be replaced by --a--.

(2) Line 14, "irradiation" should be replaced by --irradiating--.

Appropriate correction is required.

10. Claim 41 is objected to because of the following informalities:

Line 1, "the" before "injection" should be replaced by --an--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 12 and 20-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 recites "the flow structural formation of the target material is irradiated essentially perpendicular onto the surface with the local curvature minimum," which renders the

claim indefinite. The surface with the local curvature minimum is part of the flow structural formation. It is unclear how the flow structural formation is irradiated essentially perpendicular onto the surface with the local curvature minimum.

Claims 20 and 21 are indefinite because they fail to set forth method steps.

Claims 22-38 recite "a vacuum chamber" in a passive manner, which renders the claims indefinite. It is unclear whether the x-ray source actually comprises a vacuum chamber or this recitation merely recites intended use of a target source and an irradiation equipment.

Claims 24-26 recite "in which the target source has a nozzle with a slot-shaped outlet opening," which renders the claims indefinite. It is unclear whether the slot-shaped outlet opening refers to the non-circular outlet opening in claim 23 or an additional outlet opening.

Claims 31-33 recite "at least one heating equipment is envisaged with which at least parts of the vacuum chamber can be tempered," which renders the claims indefinite. It is unclear whether or not the x-ray source actually comprises at least one heating equipment due to the usage of the word "envisaged."

Claim 32 recites "components at and in the vacuum chamber," which renders the claim indefinite. It is unclear what are the components.

Claim 35 recites "a collection equipment if envisaged for collecting the target material after irradiation and is set up for the coolant-free operation," which renders the claim indefinite. It is unclear whether or not the x-ray source actually comprises a collection equipment due to the usage of the word "envisaged."

Claim 36 recites "an x-ray lithography device" in a passive manner, which renders the claim indefinite. It is unclear whether the x-ray source actually comprises an x-ray lithography device or it merely recites an intended use of the x-ray source.

Claim 38 recites "a processing chamber" in a passive manner, which renders the claim indefinite. It is unclear whether the x-ray source actually comprises a processing chamber or it merely recites intended use of the x-ray source.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. Claims 1-7, 13, 22-25, 27, 39, and 40-43 are rejected under 35 U.S.C. 102(e) as being anticipated by Orsini et al. (U. S. Patent No. 6,744,851 B2).

With respect to claims 1-7, Orsini et al. disclosed a method that comprises the steps of: providing a target material (20) in the form of a free flow structural formation in a vacuum chamber (column 3, lines 29-32), wherein the flow structural formation is formed in such a way that the target material, at least at a location of irradiation, has a surface with a local curvature

minimum; and irradiating the target material in order to produce a plasma condition (30) in which x-radiation is radiated therefrom (column 3, lines 28-47). Note: The slot-shaped outlet opening (46) is as capable of producing a flow structural formation (48) having a surface with a local curvature minimum as the slot-shaped outlet opening described in the specification. Furthermore, the recitation "wherein the flow structural formation is formed in such a way that the target material, at least at a location of irradiation, has a surface with a local curvature minimum" does not actually require irradiating the target material at the surface with the local curvature minimum.

With respect to claim 13, Orsini et al. disclosed the method according to claim 1, wherein the target material is liquefied gas (column 3, lines 22-24).

With respect to claim 22, Orsini et al. disclosed an x-ray source that comprises: a vacuum chamber (column 3, lines 29-32); a target source (10) that provides a target material in the vacuum chamber, wherein the target source is adapted for forming the target material in such a way that the target material in a flow structural formation (48) has, at least at a location of an irradiation, a surface with a local curvature minimum; and an irradiation equipment (26) for irradiating the target material in the vacuum chamber. Note: The slot-shaped outlet opening (46) is as capable of producing a flow structural formation (48) having a surface with a local curvature minimum as the slot-shaped outlet opening described in the specification. Furthermore, the recitation "wherein the target source is adapted for forming the target material in such a way that the target material in the flow structural formation has, at least at the location of the irradiation, a surface with a local curvature minimum" does not require the irradiation equipment to irradiate the surface with the local curvature minimum.

With respect to claim 23, Orsini et al. disclosed the x-ray source according to claim 22, wherein the target source comprises a nozzle with a non-circular outlet opening (46).

With respect to claim 24, Orsini et al. disclosed the x-ray source according to claim 23, wherein the non-circular outlet opening is a slot-shaped outlet opening (46).

With respect to claim 25, Orsini et al. disclosed the x-ray source according to claim 24, wherein the slot-shaped outlet opening is rectangular (Fig. 5).

With respect to claim 27, Orsini et al. disclosed the x-ray source according to claim 23, wherein the nozzle is the vacuum chamber is arranged in a rotary manner (the vacuum chamber is capable of being rotated).

With respect to claim 39, Orsini et al. disclosed an apparatus that comprises: a vacuum chamber (column 3, lines 29-32); and a nozzle with a slot-shaped outlet opening (46) for injecting liquid target material into the vacuum chamber (column 4, lines 11-28).

With respect to claim 40, Orsini et al. disclosed apparatus according to claim 39, wherein the nozzle is arranged in a rotating manner around an axis that runs parallel to the direction of the injection of the liquid target material. Note: The entire apparatus is capable of being rotated about an axis that runs parallel to the direction of the injection of the liquid target material.

With respect to claim 41, Orsini et al. disclosed a method for an injection of a liquid target material in the form of a free flow structural formation into a vacuum chamber, the method comprises: forming a flow structural formation such that the target material has a surface with a local curvature minimum (column 4, line 11-28). Note: The slot-shaped outlet opening (46) is as capable of producing a flow structural formation (48) having a surface with a local curvature minimum as the slot-shaped outlet opening described in the specification.

With respect to claim 42, Orsini et al. disclosed the method according to claim 41, wherein forming the flow structural formation comprises forming a free, lamella-shaped sheet (48). The slot-shaped outlet opening (46) is as capable of producing a flow structural formation (48) having a surface with a local curvature minimum as the slot-shaped outlet opening described in the specification.

With respect to claim 43, Orsini et al. disclosed the method according to claim 41, wherein the flow structural formation comprises a concave surface at least on one side. Note: The slot-shaped outlet opening (46) is as capable of producing a flow structural formation (48) having a concave surface as the slot-shaped outlet opening described in the specification.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Orsini et al. (U. S. Patent No. 6,744,851 B2) as applied to claim 22 above, and further in view of Richardson et al. (U. S. Patent No. 5,459,771).

With respect to claim 31, Orsini et al. disclosed the x-ray source according to claim 22. However, Orsini et al. did not disclose that the x-ray source further comprises at least one heating equipment that tempers at least parts of the vacuum chamber.

Richardson et al. disclosed an x-ray source that comprises: a collection equipment (330) for collecting the target material after irradiation; and a heating equipment (340) that liquefies unused target material (column 3, line 65 - column 4, line 6).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a heating equipment, since a person would be motivated to remove used target material efficiently.

17. Claims 19, 34-36, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orsini et al. (U. S. Patent No. 6,744,851 B2) as applied to claims 13 and 22 above, and further in view of Matsui et al. (U. S. Patent No. 5,991,360).

With respect to claim 19, Orsini et al. disclosed the method according to claim 13. However, Orsini et al. did not disclose that the method further comprises collecting target material after irradiating in a collection equipment at ambient temperature.

Matsui et al. disclosed a method that comprises collecting target material after irradiating in a collection equipment at ambient temperature (column 6, lines 42-46).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to collecting target material after irradiating in a collection equipment, since a person would be motivated to remove unused portion of the target material from the vacuum chamber.

With respect to claim 34, Orsini et al. disclosed the x-ray source according to claim 22. However, Orsini et al. did not disclose that the irradiation equipment comprises an irradiation optical system arranged outside of the vacuum chamber.

Matsui et al. disclosed an x-ray source that comprises: a vacuum chamber (5); and an irradiation equipment (120) that comprises an irradiation optical system (3) arranged outside of the vacuum chamber.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an irradiation optical system outside of the vacuum chamber, since a person would be motivated to adjust a laser beam irradiated from the irradiation equipment.

With respect to claim 35, Orsini et al. disclosed the x-ray source according to claim 22. However, Orsini et al. did not disclose that the x-ray source further comprises a collection equipment for collecting the target material after irradiation.

Matsui et al. disclosed an x-ray source that comprises a collection equipment (130) for collecting the target material after irradiation.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a collection equipment for collecting the target material after irradiation, since a person would be motivated to remove unused portion of the target material from the vacuum chamber.

With respect to claims 36 and 38, Orsini et al. disclosed the x-ray source according to claim 22. However, although Orsini et al. disclosed that an x-ray source for lithography (column 1, lines 18-34), Orsini et al. did not disclose that the x-ray source further comprises an x-ray lithography device arranged in the vacuum chamber.

Matsui et al. disclosed an x-ray source that comprises an x-ray lithography device (200) arranged in the vacuum chamber.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide an x-ray lithography device arranged in the vacuum chamber, since a person would be motivated to employ x-rays produced in the vacuum chamber for lithography.

Allowable Subject Matter

18. Claims 8-11 and 14-18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

19. Claims 26 and 28-30 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- (1) Tomie (U. S. Patent No. 7,576,343 B2) disclosed a method and an apparatus for generating laser produced plasma.
- (2) Johnasson et al. (U. S. Patent No. 7,217,939 B2) disclosed a capillary tubing.
- (3) Buijsse (U. S. Patent No. 7,173,999 B2) disclosed an x-ray microscope having an x-ray source for soft x-ray.

- (4) Shiraishi (U. S. Patent No. 7,145,987 B2) disclosed an x-ray generating device and exposure apparatus.
- (5) Hatanaka et al. (U. S. Patent No. 7,023,961 B2) disclosed a method and an apparatus for generating x-rays.
- (6) Schmidt et al. (U. S. Patent No. 6,647,088 B1) disclosed production of a dense mist of micrometric droplets for UV lithography.
- (7) Kondo et al. (U. S. Patent No. 6,504,903 B1) disclosed a laser-excited plasma light source.
- (8) Bisschops (U. S. Patent No. 6,493,423 B1) disclosed a method of generating extremely short wave radiation.
- (9) Kandaka et al. (U. S. Patent No. 6,339,634 B1) disclosed a soft x-ray light source.
- (10) Kondo et al. (U. S. Patent No. 6,285,743 B1) disclosed a method and an apparatus for soft x-ray generation.
- (11) Smither et al. (U. S. Patent No. 4,953,191) disclosed a high intensity x-ray source using liquid gallium target.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen C. Ho whose telephone number is (571) 272-2491. The examiner can normally be reached on Monday - Friday from 9:00 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Allen C. Ho/
Primary Examiner
Art Unit 2882